LV24-33™

User manual

Flash program is used to transfer a .hex file from a PC to the microcontroller memory by means of the appropriate hardware. Every flash program includes numerous options used for setting the microcontroller's configuration bits.

Programmer

MikroElektronika
SOFTWARE AND HARDWARE SOLUTIONS FOR EMBEDDED WORLD ...making it simple

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in Mikroelektronika.
The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Nebojsa Matic
General Manager

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General Information

The *LV24-33*™ programmer is a great tool used for programming PIC microcontrollers. Its unique design and ease of use make it a very popular tool among beginners and professional users alike. The *LV24-33* programmer communicates to a PC through a USB cable which is also used for powering the programmer. In addition, it is a low power consumption device, which makes it ideal for working with notebooks. In order to use this programmer, it is necessary to have the appropriate software *mikroProg Suite for PIC*™, provided on the product CD, installed on your PC. The latest version of this software with updated list of supported microcontrollers can be downloaded free of charge from our website at www.mikroe.com. Use any of Mikroelektronika's compilers to write a code as they provide an easy way of debugging/simulating the operation of the target device. The mikroICD debugger is an integral part of the programmer that enables you to run a program step by step while monitoring the state of all registers within the microcontroller. It may be used with all Mikroelektronika's compilers such as mikroC PRO for PIC, mikroBASIC PRO for PIC and mikroPASCAL PRO for PIC.

Package contains:

Programmer:	LV24-33
CD:	product CD with the relevant software
Cables:	USB cable
Documentation:	LV24-33 programmer, mikroProg Suite for PIC, mikroICD and Installing USB Drivers manuals

System specification:

Power supply: via USB cable (5V DC)
Power consumption: 10mA
Dimensions: 13 x 4 x 2.4cm (5.1 x 1.57 x 0.94 inch)
Weight: ~180g (0.4lbs)

1.0. Connecting the Programmer

The *LV24-33* programmer is connected to the microcontroller via a flat cable ending with IDC10 connector. The microcontroller may be soldered on the target device or plugged into the socket on the board intended for the microcontroller's programming. In both cases, it is necessary to connect the microcontroller pins used for programming to a 2x5 connector. The *LV24-33* programmer's plastic case provides the IDC10 connector's pinout on the basis of which you should establish connection between the microcontroller on the target device and this connector. Refer to Figure 1-3.

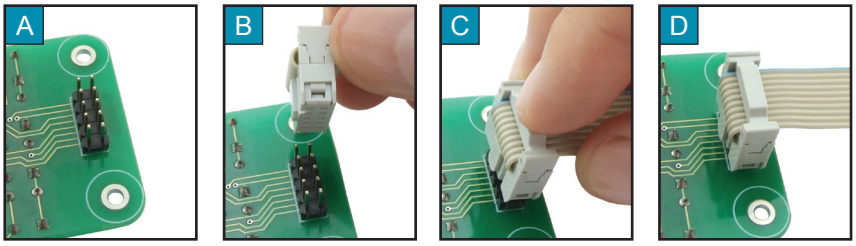

Figure 1-1: Connecting *LV24-33* programmer

Figure 1-2: *LV24-33* connected to the *LV24-33* experimental board

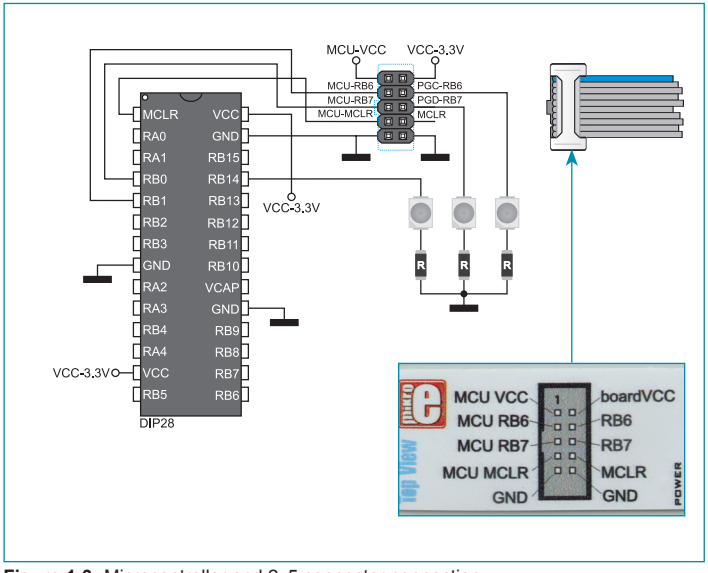

Figure 1-3: Microcontroller and 2x5 connector connection

The *LV24-33* programmer is normally powered from the PC through a USB port. However, it is also possible to provide power supply from the target device the *LV24-33* programmer is connected to. In this case it is necessary to open the *LV24-33* programmer's plastic case, remove jumper J1 and place jumper J5 in the 5V position. The 5V power supply voltage provided in this way should be stabilized.

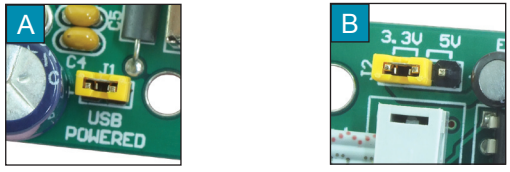

Figure 1-4: The *LV24-33* programmer is powered from the PC through a USB port (standard position of jumper)

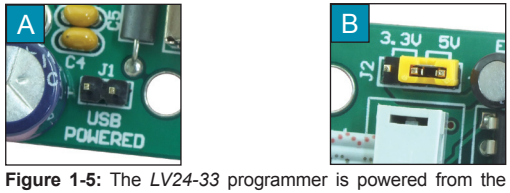

Figure 1-5: The *LV24-33* programmer is powered from the target device supplied with the microcontroller.

When designing a target device to install the microcontroller on, it is important to be familiar with the pinout of IDC connector provided on the *LV24-33* programmer. A small notch on the upper side of this connector makes its orientation easier when plugging it into the on-board 2x5 connector. Figure 1.3 shows pinouts of both connectors.

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2.0. Programmer's Operation

The *LV24-33* programmer employs five pins to access the microcontroller. Two pins are used to provide power supply and ground from the *PICflash* programmer through. The other three pins are used for data transfer as well as for entering the microcontroller into the programming mode. These five pins are marked as follows:

MCU-VCC - It is used to provide power supply from the *PICflash* programmer through;
MCU-PGC - In-Circuit Debugger and ICSP programming clock pin;
MCU-PGD - In-Circuit Debugger and ICSP programming data pin;
MCU-MCLR/Vpp - Master Clear (for MSU reset) or programming voltage Vpp; and
GND - GND pin.

Before the programming process starts, it is necessary to write a code in one of PIC compilers and generate a hex. file to be loaded into the microcontroller using the *LV24-33* programmer. The programming process starts by clicking on the *Write* button within the *mikroProg Suite for PIC* software. The programmer will automatically provide the MCU-MCLR/Vpp pin with a high level voltage signal, thus enabling the microcontroller to enter the programming mode. The hex. file is then loaded into the microcontroller using MCU-PGC and MCU-PGD lines. When the programming process is complete, the programmer sets the microcontroller back into the operating mode.

The programmer's mode of operation changes using an electronic multiplexer. Due to it, the *LV24-33* programmer may be connected to the microcontroller all the time without affecting its operation. It is a part of the programmer that serves as a switch enabling the programming to be connected/disconnected from the microcontroller's pins used for programming.

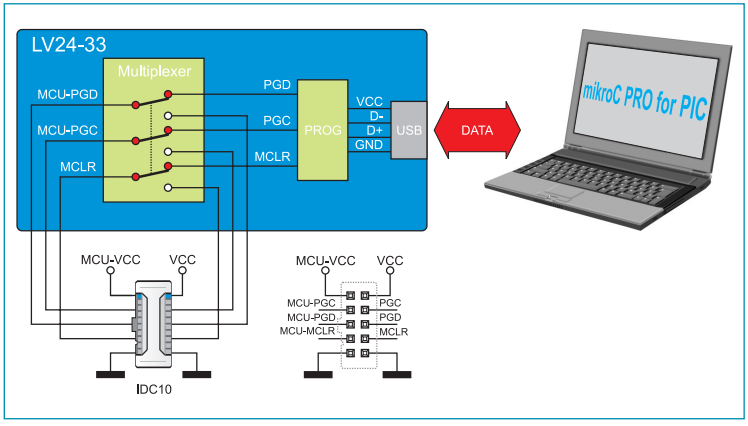


Figure 2-1: The multiplexer in the programming mode. During programming, the multiplexer disconnects the microcontroller pins used for programming from the target device. This enables the programming process to be safely performed without affecting the operation of the device itself. It also prevents external signals from affecting the programming process. When the programming process has been completed, the multiplexer releases the microcontroller pins used for programming so as they can be used as I/O pins.

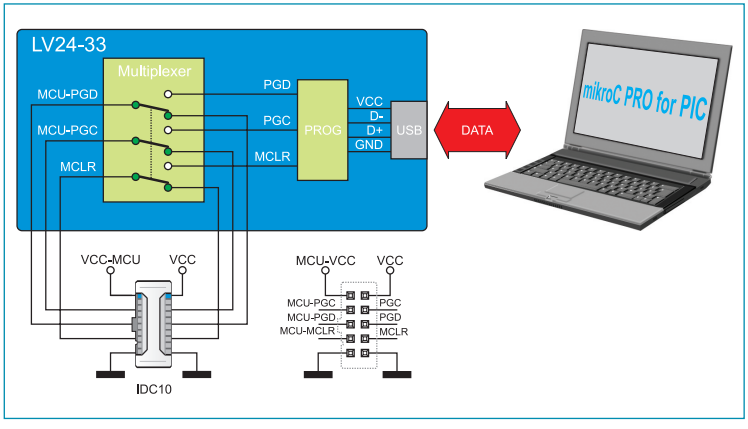
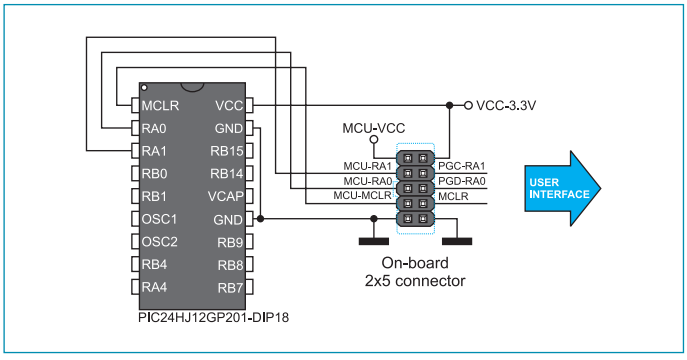


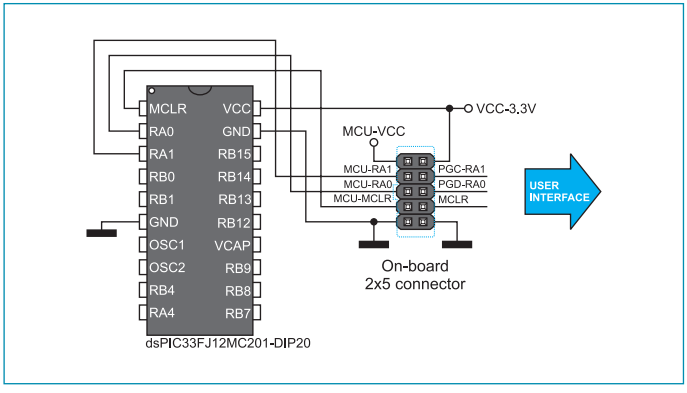
Figure 2-2: The multiplexer in the operating mode. When the programming process has been completed, the multiplexer releases the microcontroller pins used for programming, thus enabling them to be used as inputs/outputs. This also enables the programmer to remain connected to the target device without affecting its operation.

3.0. Connecting Micocontroller and 2x5 Connector

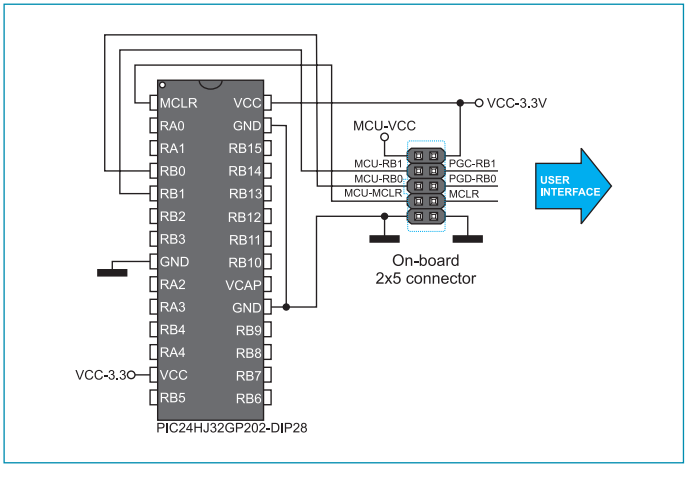
The following examples shows various ways of connecting microcontrollers to 2x5 connector. It is highly recommended to check which microcontroller pins are used for programming no matter which type of PIC microcontroller is in use.



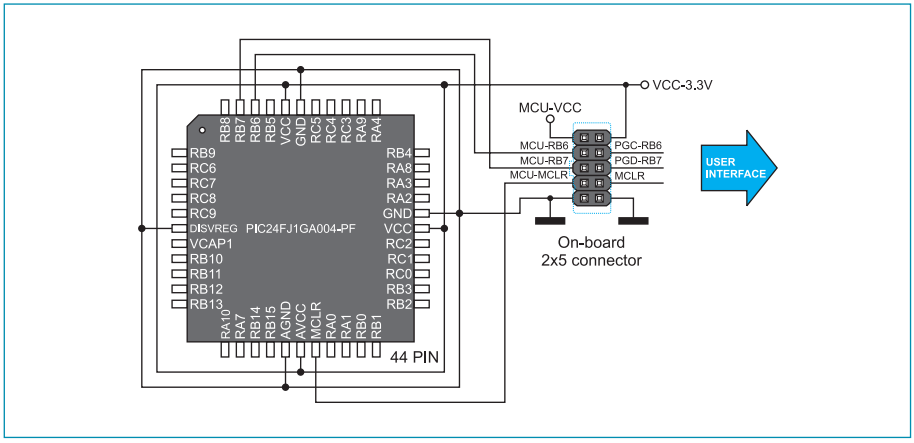
The connection schematic for 2x5 connector and 18-pin PIC microcontrollers in DIP package.



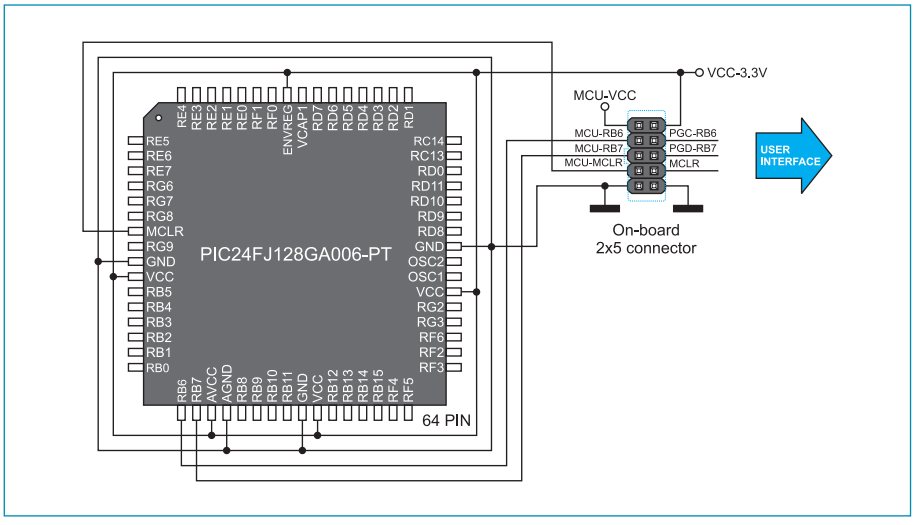
The connection schematic for 2x5 connector and 20-pin PIC microcontrollers in DIP package.



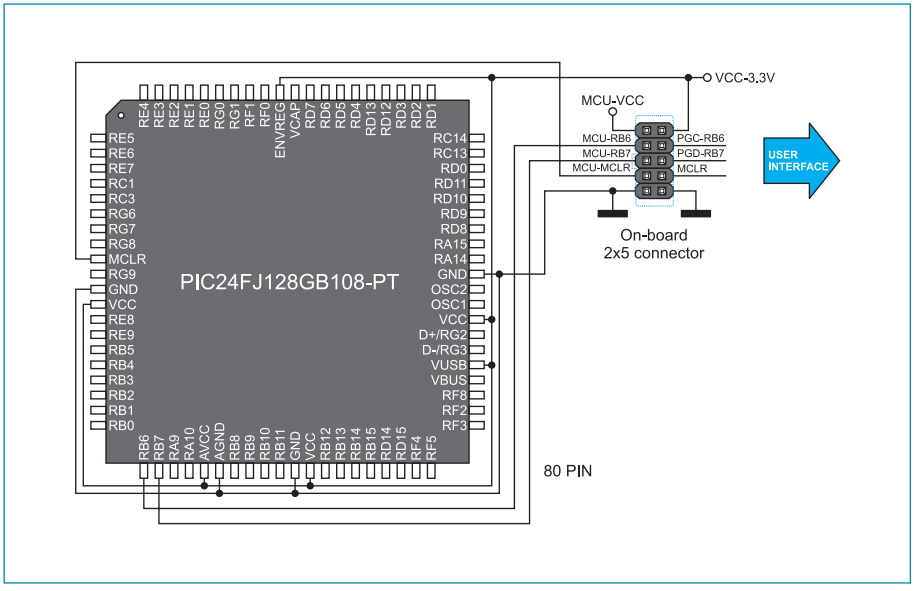
The connection schematic for 2x5 connector and 28-pin PIC microcontrollers in DIP package.



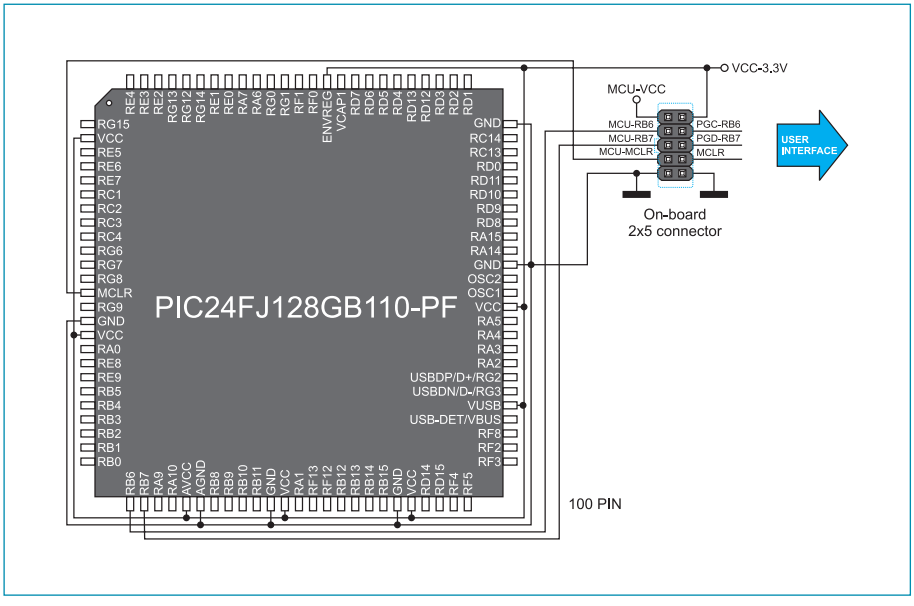
The connection schematic for 2x5 connector and 44-pin PIC microcontrollers in TQFP package.



The connection schematic for 2x5 connector and 64-pin PIC microcontrollers in TQFP package.



The connection schematic for 2x5 connector and 80-pin PIC microcontrollers in TQFP package.



The connection schematic for 2x5 connector and 100-pin PIC microcontrollers in TQFP package.

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4.0. Microcontroller's Operation after Programming

When the programming process is complete, you can remove IDC connector of the *LV24-33* programmer from the on-board 2x5 connector. This causes the microcontroller pins used for programming (RB6, RB7 and MCLR) to be disconnected from the rest of on-board electronics. In order to use these pins as inputs/outputs, it is necessary to place jumpers over the on-board 2x5 connector, as shown in Figure 4.1.

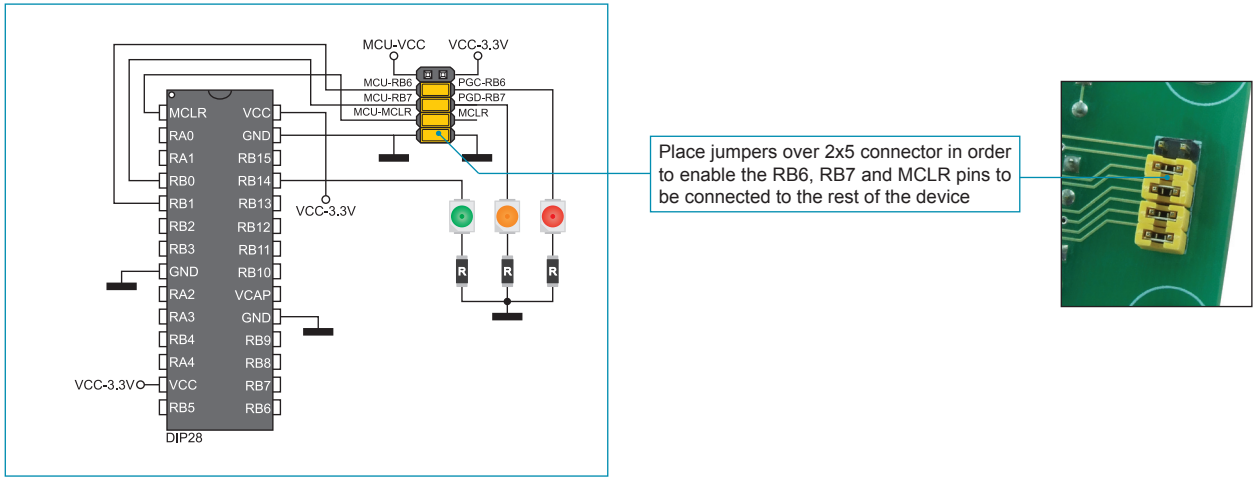

Figure 4-1: Microcontroller after programming

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